

STATE OF UTAH



DEPARTMENT OF
COMMUNITY AND
ECONOMIC
DEVELOPMENT

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Utah Centers of Excellence Program

Report to the Utah Legislature

1 November 1991

Ratio of Matching Funds to State Contract:		
FY 1991 Matching Funds	.....	\$33,160,390
FY 1991 State Contracts	.....	\$2,287,500
Annualized Match Ratio	.....	\$14.50:1
Total Jobs Created		
From Current Centers	.....	2,026
Average Salary:	.....	\$28,936
Annualized Economic Impact:		
Total:	\$87,935,744	
Annual Return to the State		
Total:	\$10,991,968	
Ratio:	\$4.81:1	
COEP ANNUAL GROWTH		
Industry Jobs Created	748	1,216
Center Jobs Created	557	810
Total Employees	1,305	2,026
Businesses Created	10	14
Matching Funds Ratio	\$14.37:1	\$14.50:1
Return on Investment	\$2.22:1	\$4.31:1

U. S. I CENTER OF EXCELLENCE PROGRAM
Advisory Council

Larry H. Brim, Ph.D., Director of Research/Development
Hyclone Laboratories
Logan, Utah

Ladd E. Christensen, President
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Oren B. Phillips, Vice President Business Development
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Signetics, Inc.
Orem, Utah

Gerald W. Sharp, Ph.D.
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John M. Simonsen, Ph.D.
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Provo, Utah

James Lee Soreason, President
Deseret Research, UBTL, DataChem (CEO)
Salt Lake City, Utah

Rex S. Spendlove, Ph.D., President
Hyclone Laboratories
Logan, Utah

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Utah Centers of Excellence Program FY 1991

The Utah Centers of Excellence Program (COEP) was organized by Governor Norman H. Bangerter and the Utah State Legislature in 1986 to create new businesses and skilled jobs by expediting the commercialization of university technology. Since the program's inception six years ago, over 50 new high tech companies (14 this past year) and 2,000 skilled jobs have been created. This is an increase of over 700 new jobs from last years report. Access to center research is vital to the operation of an additional 83 Utah businesses. While the average technology development program typically takes eight years to show economic impact, Utah's efforts are already paying dividends. It is estimated that each dollar the state spends on technology development returns over \$4.80 to Utah's tax base. Funds have been strategically invested in university research to strengthen Utah's industrial advantage in aerospace, biomedical, information and natural resource technologies. Centers also allow the State to pursue technologies that will eventually form the base to attract new industry.

Eight new centers have been created this past year. These centers represent profitable new ventures for the state in natural resources, computer science and cancer genetic research. Rather than invest in raw research, COEP funds supplemental activities to commercialize late stage technology already being supported by Federal and private resources. State support accounts for an average of 8.5% of each center's budget. Unlike most states that support basic research over an 8-10 year period, Utah focuses on developing viable commercial entities within three to five years of funding. Before any state money is allocated annually, each center undergoes extensive technical and market evaluations to measure its progress towards becoming self-sustaining. Within the past year, six centers were promoted to Distinguished Center status. This designation is given to those centers that have attracted over \$10 million in funding from outside sources or have achieved national recognition for excellence in research. Three additional centers received substantial Federal grants and were promoted to national centers of research.

In January, an independent review of the Centers of Excellence Program was conducted by Dr. Walter Plosila. An expert who founded the largest state technology support program in the nation, Dr. Plosila is a reviewer of over 30 other state technology programs. After his evaluation Dr. Plosila remarked, "Utah has been able to mount an impressive effort over the past five years with a minimal state financial investment." He also noted that Utah's COEP has the largest matching funds leverage of any State technology program in the nation. COEP presently obtains \$14.50 in Federal and private support for every \$1 of state funding. With regard to future funding strategies Dr. Plosila concluded, "To compete effectively with other states and in the world economy, Utah will have to consider changes in its investment efforts. Today state funding is too small and distributed too widely to take full advantage of emerging opportunities. Not only is the Program one of the most successful state technology programs in the U.S., but its economic impact has resulted in the Program returning more in revenues than it is costing the State in expenditures."

UTAH CENTERS OF EXCELLENCE PROGRAM

Financial Return Summary

(Period Covering October 1, 1990 to November 1, 1991)

Ratio of Matching Funds to State Contract:

Oct 1990 thru Oct 1991 Matching Funds	... \$33,160,390
Current State Contracts	... \$2,287,500
Annualized Match Ratio	... \$14.5:1

Total Jobs Created

From Current Centers	... 2,026
Average Salary:	... \$28,936

Annualized Economic Impact:

Total: \$87,935,744

Annual Return to the State

Total: \$10,991,968
Ratio: \$4.81:1

Graduate Students:

There are 374 graduate students involved in center research.

Patents/Licensing Agreements:

Presently funded Centers have been issued 54 patents and entered in to 60 licensing agreements. These licensing agreements are essential to the operation of 83 Utah industrial firms.

Cumulative Spin-off Companies: 53

FY 1991 New COEP Spin-off Companies: 14

of jobs created: 48
Average salary: \$31,951

Companies Relocating to Utah for Center Technology: 5

of jobs moved: 39
Average salary: \$34,443

Federally Funded National Research Centers: 3

COEP ANNUAL GROWTH	FY 1990	FY 1991
Industry Jobs Created	748	1,216
Center Jobs Created	557	810
Total Employees	1,305	2,026
Businesses Created	10	14
Return on Investment	\$2.22:1	\$4.81:1

Distinguished Centers of Excellence: 6

Each nationally recognized for research excellence and/or receipt of more than \$10 million in Federal and industrial funding.

UTAH CENTERS OF EXCELLENCE

Newly Formed Companies FY1991/Relocated Utah Companies

Cumulative Companies Relocated to Utah to Access Center Technology:

Newly formed companies from COEP technology in 1991

COMPANY	CENTER
Futura Propulsion	Ctr for Adv. Composites
5 employees	* Advanced Laminate Technology/6 employees * Rocky Mtn. Engineering/3 employees * Medi-Sight/7 employees
Nutriscience, Inc.	Ctr for Dairy Foods Tech
1 employee	* Performance Composites/3 employees * Creature Composites/2 employees * Synergy Marketing/3 employees * Emily Rose/13 employees * Dimensional Research/4 employees
Intraspace	Ctr for Aerospace Tech
20 employees	
Systems Impact Inc	Ctr for Information Tech
6 employees	* Helix Technologies/1 employee
Silicon Graphics	Center for Biopolymers
7 employees	
Relocated Businesses:	5
Number of Jobs Moved:	39
Average Salary:	\$34,443
Center for Quality and Integrity Design at the University of Utah	* Technology Mgt. Assoc., Inc./4 employees
New Companies Created:	14
New Jobs Created:	48
Average Salary:	\$32,951

UTAH CENTERS OF EXCELLENCE

Spin-Off Companies

November 1991

AEROSPACE AND MFG.

- *Center for Advanced Composites, BYU
Advanced Laminate Technology/6 employees/
Rocky Mtn. Engineering/3 employees/
Medi-Sight/7 employees
Performance Composites/3 employees
Creature Composites/2 employees
Synergy Marketing/3 employees
Emily Rose/13 employees
Dimensional Research/4 employees

- *Center for Aerospace Technology, WSU
Simulacrum/2 employees
Wasatch Research & Engineering/5 employees
- Center for CIM, BYU
EDGE Foundation/15 employees
EDGE, Inc./6 employees
Ozone Saver Industries/5 employees
CAM Software, Inc./8 employees
CIM Training Center/1 employee
Smartware/1 employee
UtahPODS Manufacturing Co-op/2 employees

- Center for Engineering Design, U/U
Animate Systems/16 employees
Sarcos Research Corp./12 employees
Sarcos, Inc./6 employees

- Center for Microelectronics, U/U
Bonneville Microelectronics/2 employees

- Center for Quality and Integrity Design, U/U
Technology Mgt. Assoc., Inc./4 employees
- *Center for Space Engineering, USU
Interactive Resources Co./2 employees
Icomp, Inc./1 employee
Globesat Holding Co./8 employees
Medcom, Inc./1 employee
CXT, Inc./3 employees
Space Dynamics Laboratory/269 employees

BIOMEDICAL TECHNOLOGIES

- *Center for Adv. Supercritical Fluid Separation, BYU
Chromatography Conferences/1 employee
Sensar Corporation/1 employee
- *Center for Biocatalysis, USU
Whetstone/5 employees/
- *Center for Biopolymers, U/U
Protein Solutions, Inc./3 employees
- *Center for Cancer Genetic Epidemiology, U/U
Helix Technologies/1 employee

- *Center for Controlled Chemical Delivery, U/U
Insitech, Inc./3 employees
- *Center for X-Ray Imaging, BYU
MOXTEK/16 employees

- INFORMATION TECHNOLOGIES**
- *Center for Computer Graphics and Scientific Visualization, U/U
Engineering Geometry Systems/2 employees
- *Center for Computer Based Education, BYU
Cali, Inc./21 employees
- Center for Information Technology, USU
Effective Instructional Technologies/5 employees
- Center for Signal Processing, BYU
ASTECH, Inc./34 employees
Deseret Digital Systems/6 employees
Vector Technologies/1 employee

* Currently funded state center

- *Center for Base Technical Education, U/U
Assessment Co./3 employees
Software Co./2 employees
- *Center for Inverse Problems, Imaging & Tomography, U/U
Techniscan/16 employees

- NATURAL RESOURCES/AGRICULTURE**
- *Center for Advanced Combustion Engineering Research, BYU
Reaction Engineering International/9 employees
- *Center for Coal Research, U/U
FentoScan Corp./4 employees/
International Resin Resources/2 employees/
- *Center for Chemical Separations, WSU
IBC Advanced Technologies/24 employees
- *Center for Meat Processing Technology, U/U
Mountain Lamb Co-op

UTAH CENTERS OF EXCELLENCE
Benefiting Utah Companies
November 1991

AEROSPACE & MFG.

Center for Advanced Composites, U/U

Delta, Inc./70 employees

EDO/70 employees

Evolution Skis/10 employees

Fiber Tek/9 employees

Terra Tek/15 employees

INCO Vapor Fab/3 employees

Fiber Dynamics/6 employees

AeroTrans/7 employees

Springlite/5 employees

Megadiamond/3 employees

Pro Design Corporation/2 employees

Center for Advanced Materials, U/U

Ceramatec, Inc./1 employee

Nova Tech

Thiokol

Evans & Sutherland/13 employees

Hercules/30 employees

Fisher Company/1 employee

Westscot Corp./15 employees

Concoyle Oilfield Tools, Inc./2 employees

Space Systems Engineering

Center for Engineering Design, U/U

IOMED, Inc./109 employees

Center for Quality and Integrity Design, U/U

FASIDE International, Inc./4 employees

Center for URI, USU

USAF Ogden Air Logistics Center

BIOMEDICAL TECHNOLOGIES

Center for Biocatalysis, USU

Hyclone Labs

Computer Systems Architects

Center for Biopolymers, U/U

Becton Dickinson Critical Care Monitoring

Cardiopulmonics

HyClone Labs

Research Industries

Center for Controlled Chemical Delivery, U/U

TheraTech/47 employees

Research Medical, Inc./108 employees

Center for Advanced Supercritical Fluid Separation at B.Y.U.

Lee Scientific/52 employees

Center for Inverse Imaging and Tomography, U/U

Technican/8 employees

R-Con International/29 employees

Nichols Research/18 employees

MOXTEK/16 employees

Unisys/13 employees

Evans and Sutherland

Center for Laser Institute, U/U

Cooper LaserSonics/5 employees

HGM, Inc./100 employees

Metalaser Corp.

Primemed

QLT, Inc./8 employees

Innovative Imaging Sciences/1 employee

Center for X-Ray Imaging, BYU

TechniScan/16 employees

INFORMATION TECHNOLOGIES

Center for 3-D Graphics, Dixie College
Strata Inc./18 employees

Center for CAEDM, BYU
CIMETRIX/16 employees
Design Synthesis/5 employees
Evans & Sutherland/1 employee
Hercules/8 employees
Hewlett-Packard/1 employee
IOMEGA Corp./4 employees
Thiokol/9 employees
Production Modeling Corp./19 employees
VALTEK/5 employees
Viewpoint Animation/1 employee

Center for Computer Based Education, BYU
LinguaTech

Center for Information Technology, USU
Digitran/9 employees
SkiHi/8 employees

Center for Signal Processing, BYU
Softsolutions
Eyring Research Institute
Space Dynamics Lab
Unisys Corporation

Center for Supercomputer, U/U
IBM
Thiokol
Hercules
WordPerfect
Kennebott
3-M Health Systems
SyncSort
Eden Solutions
Relational Technology Products

Center for VLSI Design, U/U
Bonneville Microelectronics Inc./5 employees
Phonex/unknown

NATURAL RESOURCES AND AGRICULTURE

Center for Advanced Combustion Engineering Research at BYU
Ford, Bacon, Davis
Geneva Steel
Pacific Corp. Electronic Generation

Questar
Hercules
UP&L

Center for Biotechnology, USU
UP&L
Hyclone Labs
Natural Product Sciences
Thiokol
AgriDyne Technologies, Inc.

Center for Meat Processing Technology, USU
E.A. Miller & Sons

Center for Chemical Technology, WSU
Solaray, Inc./39 employees
Monarch Lab/5 employees
Trysan/5 employees
Western Zirconium/7 employees
Morton Automotive/18 employees
KEMGAS/7 employees
Buena Ventura/9 employees
Great Salt Lake Mineral/3 employees
Artistic Precision Enterprises/2 employees
Reily Wendover/37 employees

Center for Coal Research, U/U
Advanced Processing Technologies/6 employees
CPS/37 employees

Center for Dairy Foods Technology, USU
Heart-to-Heart Foods/5 employees
Gossner Foods, Inc

Center for Pyrometallurgical, U/U
Kennebott/3,000 employees

Utah Centers of Excellence Program

Definition of Terms

Benefiting Utah Companies

All Utah companies that have been created by or are in a substantial way, using technology from centers.

Center of Excellence

Located at a Utah institution of higher learning, a "Center" is a designated location where specific research and development is conducted and technology transfer takes place, leading to commercialization of the products of that research.

Faculty, Graduate Student and Post Doctorates employed

Positions being salaried directly as a result of centers activity.

Industry jobs created

Those jobs that have directly or indirectly resulted from centers activity.

New Companies

New Utah companies formed using the research and development of the specific technology at the institution since the centers program began.

State Contract

Dollar amount of commitment to the center by the State Department of Community and Economic Development. State monies are not released until invoices are received for actual expenses and documentation of match funds.

Distinguished Center of Excellence

Funding in excess of \$10 million or national recognition.

AEROSPACE AND MANUFACTURING

Center for Advanced Composites Manufacturing and Engineering

Dr. A. Brent Strong/Brighton Young University/Provo, Utah

Established July 1990 to assist existing composite manufacturing companies within the state. This center offers access to unique damage testing and repair system equipment. Current research is focused on developing composite cutting capabilities in waterjet, laser and machining with diamonds. During the first year of funding, this center spawned 5 new companies to Utah's private sector.

Overview		Technologies	Status	Economic Impact
Current State Contract	\$100,000	*Basic composite, ceramic and plastic manufacturing methods:	*National technology workshop held w/NIST. Highest attendance of any NIST workshops in any state.	*Gave key start-up assistance to 8 new Utah companies.
Matching Funds Cumulative	\$1,166,050 1,305,853	-filament winding -lay-up/laminating -resin transfer molding (RTM) -molding -automated manufacturing -repair/logistics -autoclave curing -vibration damping -machining and cutting -matrix/reinforcement interface	*15 scientific papers published.	(Advanced Laminate Technology, Emily Rose Inc., Futura Propulsion Sys., Performance Composites, Synergy Marketing, Ultra Lite of America, Creature Composites and Rocky Mtn Eng.
Industry Jobs Created	219			
Center Related Jobs	14			
Benefiting Utah Companies	11			
Center Spin-offs	8			
Patents Applied	3			
Patents Issued	1			
License Agreements	1			

- *Basic composite, ceramic and plastic manufacturing methods:
- filament winding
- lay-up/laminating
- resin transfer molding (RTM)
- molding
- automated manufacturing
- repair/logistics
- autoclave curing
- vibration damping
- machining and cutting
- matrix/reinforcement interface

- *1 patent issued:
Incremental forming of Thermoplastic composites.

- *Received materials grant of over \$800,000 from McDonnell Douglas.

- *Study underway with Thiokol to develop machining of composites.
- 1)Device for sensing cure of composites.
- 2)Enhanced thermoplastic adhesion to fibers using plasma discharge.
- 3)Improved method for dumping composite parts.

Center for Advanced Materials and Microelectronics

Dr. Gerald B. Stringfellow/University of Utah/SLC, Utah

Established as a center in 1988. This center provides unique testing facilities, technical expertise and problem solving assistance to Utah industry. Composite, ceramic and semiconductor materials are currently being explored for structural, aerospace and electronic applications.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	* <i>Multiple layer epitaxy</i>	* <i>Focus on III/V compounds, composites & ceramics estb.</i>	* <i>Option on infrared detection chip license taken by Space Eng. Inc., Logan, Utah</i>
Matching Funds Cumulative	\$1,605,704 \$3,940,251	* <i>III/V compound chip design</i>	* <i>Advanced material for infrared detection in 8-12 micron range designed & disclosed to patent office</i>
Industry Jobs Created	45	* <i>Ceramics as solid electrolytes and structural components</i>	* <i>Center heavily involved helping move a branch of IBM, Philips or Hewlett Packard to Utah</i>
Center Related Jobs	20	* <i>Leading edge research in bismuth oxide fuel cells</i>	
Benefiting Utah Companies	6	* <i>Close collaboration with local composites manufacturers</i>	* <i>Ceramatec, Beta Power Inc. and Edo Western are successful small high tech ceramics firms</i>
Patents Applied	3	* <i>Composite materials</i> * <i>Organometallic vapor phase epitaxy</i>	* <i>Image analysis system for failure diagnosis available for use by local industry</i>
Patents Issued	1	* <i>Polymer property prediction models</i>	* <i>Unique combined thermogravimetry/mass spectrometry facilities available</i>
License Agreements	--		* <i>\$100K grant from Exxon Chemicals for polymer modeling work</i>

Center for Aerospace Science Technology

Professor Robert J. Twiggs/Weber State University/Ogden, Utah

Established as a center in 1988 to continue development of small low-earth orbiting satellites. It has expanded into a generalized technology incubation and development center that also provides engineering services to local companies. Research projects are geared toward demonstrating low-cost space technology.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	\$50,000	*Small satellite design including features such as -particle detector -color camera -light detection for ozone mapping -magnetometer -microcomputer -packet radio -communications	*Webersat satellite launched January 1990. Operational in polar orbit demonstrating advanced small satellite technology.
Matching Funds Cumulative	\$400,883 \$2,044,949		*Working with Southern California Edison in studying special application of satellite for power utility.
Industry Jobs Created	25		*Working on a satellite video digitizer with University of Alabama at Huntsville
Center Related Jobs	9		*Currently working on NASA ACTS program. *Commercial applications of small satellites and availability of launch opportunities is being explored with Dept. of Defense.
Benefiting Utah Companies	1		*Helped move new company to Utah, Intraspace with 20 jobs and \$6 million in contracts.
Spinoff companies Moved to Utah	1		
Patents Applied	--	*Development of sun angle detector	*Development of small satellite is attracting business to Utah for aerospace design and manufacturing
Patents Issued	--	*Satellite Doppler beacon	
License Agreements	--		*Working with PacifiCorp to establish a Utah company to manufacture ground stations for small satellite applications
			*Working with Wasatch Research on a Jet Propulsion Laboratory study on satellite monitoring and interception of comets and asteroids.
			*Working with Everett and Winthrop in development of an automated biomedical machine.

Center for Engineering Design

Distinguished Center

Established center in 1986. Projects include artificial limbs systems. Received Distinguished Center status in 1991.

Established center in 1986. Projects include artificial limbs, drug delivery systems, physiological signal monitors, artificial kidneys, robots and microelectro-mechanical systems. Received Distinguished Center status in 1991.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
<i>Current State Contract</i> \$100,000	* Drug delivery systems	* Robots with 54 degrees of freedom	* Recipient of major federal grants from DARPA and NSF
<i>Matching Funds Cumulative</i> \$2,973,880 \$14,720,383	* Physiological signal monitor	* Artificial limbs now widely sold	* Have created 3 companies with sales totaling \$15 million annually and 15% pretax profit
<i>Industry Jobs Created</i> 109	* Robotics	* Working on development of miniature motor with rotor the diameter of human hair	* Have created 109 jobs including 35 professional engineers
<i>Center Related Jobs</i> 42	* Microelectro systems	* New contracts with Disney, Merck and Navy Dept.	* Two more new companies emerging with annual sales potential of \$100 million each
<i>Benefiting Utah Co.'s Spin-off companies</i> 1	* Micromechanical systems	* 2 Licensing Agreements	* New robot contract will introduce technology to Europe
<i>Patents Applied</i> 21	* Artificial Limbs	* 21 U.S. Patents Issued	* Annual funding of \$3.5 million (COEP funds represent 4 to 5% of operating budget)
<i>Patents Issued</i> 3	* Artificial Kidneys	* 15 Research papers published or submitted nationally - 1991	
<i>License Agreements</i> 2			

Dr. Stephen C. Jacobsen/University of Utah/SLC, Utah

Center for Quality and Integrity Design

Emeritus Center

Dr. David W. Hoepfner, University of Utah/SLC, Utah

Established as a center in 1988, QIDEC was originally established as a Center of Excellence with the goal of "developing additional knowledge and an improved engineering educational system to help prevent our loss of mfg capability and our increased liability problems related to failures" within the engineering community in the U.S. More recently, the center expanded the goal to address the shorter term needs of industry and government in their increasing efforts to regain control over technical issues affecting product quality, safety & reliability, product liability and organizational productivity. This is being accomplished by preparing the technology so that it can be exploited within the industrial training market by QIDEC and its industrial partners.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	--	* High temperature SEM fatigue testing	* License agreement in force with FASIDE International, Inc. and Technology Management Assoc., Inc.
Matching Funds	\$286,000	* Work centered on 3 major industrial sectors:	* \$207,000 post doctoral fellowship from Rolls Royce is in final stages
Cumulative	\$921,018	1) medical device reliability 2) aircraft and aerospace structural integrity 3) structural fatigue and reliability of mechanical systems	1. High temperature adaptation for in site scanning electron microscopy fatigue stress 2. Dual actuated fatigue system attached to a scanning electron microscope
Industry Jobs Created	8	* Industrial Training	* Over \$9.4 billion spent annually in US for outside training industry
Center Related Jobs	16	* Addressing reliability and maintenance capability of country's aging commercial aircraft fleet	* Annual revenues for FASIDE, Inc. are projected to exceed \$3.4 million by 1994
Benefiting Utah Companies	2		
Patents Applied	2		
Patents Issued	--		
License Agreements	2		

Center for Space Engineering Research

Distinguished Center

Dr. Frank Redd/Utah State University/Logan, Utah

Established as a center in 1986. This center is Utah's leader for new technology developments involving space remote and in-situ sensing systems, image compression technology and small satellite systems. Sensing equipment developed at the center was the primary experimental effort on a recent shuttle mission. Besides creating six private companies, the center's research benefits many commercial space-oriented firms in Utah. Received "Distinguished Center" Status in 1991.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	* Infrared instrumentation * Sensor calibration * Upper atmosphere measurements & modeling	* Increased annual operating budget to \$20 M	* Image compression technology demonstration will facilitate new concept in video phones/market size equal to VCR's)
Matching Funds Cumulative	\$1,478,688 \$7,449,842	* Successfully competed to win \$20 M contract for critical SDI satellite (1992 launch)	* A total of 23 jobs now being directly supported by projects resulting from this center.
Industry Jobs Created	284	* Now host nationally recognized annual small satellite conference	* Serving as a nucleus for developing further expansion in the space industry in Northern Utah.
Center Related Jobs	21	* Have flown 350 payloads, 75 of which involved cryogenics	* Development of space cryogenic technology promises expansion in economic opportunities
Spinoff companies	6	* Satellite - borne imaging systems for commercial and military applications	* Tremendous success of the CIRRIS 1A experiment aboard the space shuttle Discovery promises increased business opportunity as Dept of Defense Market becomes more competitive
Patents Applied	4	* Storage of medical imagery	
Patents Issued	1	* Anticipating NASA contract for a commercial remote sensing small satellite	
License Agreements	7	* Video phones and direct satellite broadcast TV	
		* Contracted to develop "Micro Satellites" from McDonnell Douglas	
		* Small Satellite control systems	
		* Small Spacecraft Systems	

Utah Research Institute

Dr. David Norton/Utah State University/Ogden, Utah

Established as a center in 1987. The main focus is described by "Parts on Demand System (PODS)", a cooperative effort among Utah's largest universities to implement a paperless order and production process for small parts. Combined resources have enabled URI to successfully compete for military and industrial contracts.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	\$57,500	*Computer Aided Logistics Systems (CALS)	*Successful bidder on CALS/PODS program for Ogden Air Logistics Command (\$4.5 M)
Matching Funds	\$3,834,567	*Parts on Demand Systems (PODS)	*Definition of statement of work with Ogden Air Logistics Command for maintenance of Air Force weapons systems.
Cumulative	\$4,978,547		*Awarded \$380,000 contract to provide software engineering services to the Air Force Software Technology Support Center (STSC). Significant long term opportunity within the Air Force and Department of Defense
Industry Jobs Created	-		
Center Related Jobs	49	*Software for maintenance systems	
Benefiting Utah Companies	1	*Opportunity to work as a subcontractor with BDM Corporation in a Design Engineering Program Phase II for the Ogden Air Logistic Center	
Patents Applied	-	*Concepts for business creation	
Patents Issued	-		
License Agreements	-		*Received a \$3.7 million contract to help develop, test and install a Spare Parts Productions and Reprocurement System (SPARES) for Ogden Air Logistics Center

BIOMEDICAL TECHNOLOGIES

Center for Total Artificial Hearts & Biomedical Devices

Distinguished Center

Dr. Donald B. Olsen/University of Utah/SLC, Utah

Established as a center in 1987. Currently developing the first electro-hydraulic artificial heart (an advanced version of the JARVIK-7) which utilizes a single energy converter and unified ventricles that will fit in humans. Other implant projects include the urinary bladder, urethra, ureter and a sphincter. The center's scope of research includes: conceptualization, prototype development, fabrication, bench and implant testing and assessment. Received "Distinguished Center" status in 1991.

<u>Overview</u>		<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	\$2,769,003	*Engineering-miniature hydraulics, device design, design analysis, CNC machining capability, computer machining capability, device fabrication, polymers, plastics, metallics and QA/QC	*Have established shared leadership in electric artificial heart projects	*\$10 million backlog in research
Matching Funds Cumulative	\$10,755,877			
Center Related Jobs	51			
Industry Jobs Created	--	*Electrical design & fabrication *Integrated circuits & VLSI *Device testing	*Have only system with motor backup capabilities *Considered world leader in artificial organ research	*Have formed joint venture company, Cardio West with Ariz. Med Ctr.
Benefiting Utah Companies	--	*Animal experimentation-surgery, radiology, hematology, immunology, biochemistry, pathology, device retrieval/analysis	*Re-acquired pneumatic heart rights to reinstate testing.	
Patents Applied	3			
Patents Issued	2			
License Agreements	3			

Center for Biocatalysis

(National Center for the Design of Molecular Function)

Dr. Linda Powers/Utah State University/Logan, Utah

Established as a center in 1988. At the present time, no one has been able to isolate the interaction of molecules during a chemical reaction because of the speed at which it occurs. Instruments are being developed by the center that will store large amounts of information occurring simultaneously. By understanding the sequence of events during a chemical reaction, different molecules may be "programmed" for specific tasks. These "biomedical microchips" could benefit society in cancer research, industrial and environmental monitoring and waste management.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	*Parallel processing electronics	*Established as National Institutes of Health Biomedical Research Resource Center	* "TransAcq" module being licensed to CSA, a Provo Co.
Matching Funds Cumulative	*Biocatalysis *Infrared imaging		*Breakthrough in infrared imaging could make significant contribution in early disease detection
Industry Jobs Created	5	*New breakthrough in infrared imaging	
Center Related Jobs	20	*Bioanalytical instrumentation	*"WhetStone", a center spin-off will use technology in risk assessment management
Spin-off Company	1	*Molecular components and portable instrumentation for specialized monitoring	*"TransAcq" parallel processing module (powers up a PC to be equal to a VAX 8650)
Benefiting Utah Companies	2		*New spectroscopy instrumentation being developed with local industries for special biomedical applications
Patents Applied	4	*Elucidate bio-catalytic processes involving metals and develop synthetic analogs	
Patents Issued			
License Agreements	1	*New technology in automation data analysis and handling	*Two-color photothermal spectroscopy developed

Center for Biopolymers at Interfaces

Distinguished Center

Dr. Karin D. Caldwell/University of Utah/SLC, Utah

Established as a center in 1986, this is an internationally recognized industrial membership center whose focus is the study of interfacial interactions between biological and artificial materials. Knowledge of these interactions has provided valuable insight into the biocompatibility of implant materials. Research is being applied to the areas of artificial organ and implant production, production of contact lenses and diagnostic devices and the development of numerous industrial products. Received Distinguished Center status in 1991.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	* Biosensors	* 4 Utah companies are current center members	* Service labs are offering specialized analysis services to outside companies and organizations on a fee basis
Matching Funds Cumulative	\$822,395 \$4,232,182	* Purification of materials	
Center Related Jobs	30	* Diagnostics	
Industry Jobs Created	10	* Artificial organ and implant production	
Benefiting Utah Companies Moved Spinoff Companies	4 1	* Contact lenses and diagnostic devices	
Patents Applied	12	* Researching surface interactions to assist the following industries: ● Food processing ● Medical devices ● Scientific instruments ● Pharmaceuticals ● Cosmetics	
Patents Issued	1	* Semi-annual meetings hosted in Salt Lake City bring attendees from around the country	
License Agreements	—	* 12-15 projects funded annually after internal reviews are conducted	
*Researching surface interactions to assist the following industries: ● Food processing ● Medical devices ● Scientific instruments ● Pharmaceuticals ● Cosmetics			
*Studying the interaction of proteins and nucleic acids with synthetic surfaces			
*Develop methods for monitoring the status (concentration/activity) of proteins absorbed or bound to surfaces			
*12 patents pending; 1 disclosure filed			
*Consortia of faculty members and students from U of U College of Engineering, Science, Pharmacy and School of Medicine as well as faculty from BYU.			
*Significant fraction of the \$19.8 million allocated from federal sources for the soon to be built Biomedical Polymers Building			

Center for Cancer Genetic Epidemiology

Dr. Mark H. Skolnick/University of Utah/SLC, Utah

Established as a center in 1991. The development of recombinant DNA technology allows researchers the opportunity to diagnose, treat and eventually prevent human genetic disorders. Center staff members are utilizing DNA based diagnostics to determine if a patient has a predisposition to certain genetic forms of cancer. Isolating defective genes and other precursors increases the likelihood of detecting tumors at treatable stages. Genetic research at this center is focused on four of the most common cancers: breast, colon, prostate and melanoma.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	\$100,000	*Genetic Analysis	*New relationship with Memorial Sloan Kettering Cancer Center in New York.
Matching Funds Cumulative	\$1,329,109	*Gene Localization	*New spinoff company: Helix Technologies
Industry Jobs Created	1	*Gene Discovery	*Disposable kit planned to determine genetic predisposition of patient for breast cancer
Center Related Jobs	30	*Gene Diagnostics	
Benefiting Utah Co.'s Spin-off companies	1	*Gene Therapies	
Patents Applied	-		
Patents Issued	-		
Licenses Agreements	1		

Center for Controlled Chemical Delivery

Distinguished Center

Dr. Sung Won Kim/University of Utah/SLC, Utah

Established as a center in 1986. A world leader in drug delivery systems, this center is developing innovative delivery systems for pharmaceutical and chemical agents. One of their spin-off companies recently announced a multi-million dollar research contract with Syntex, a multi-billion dollar in sales U.S. pharmaceutical company. Researchers are working on oral delivery systems for insulin that will promote absorption. Additional systems are being designed for the continuous release of drugs for anti-hypertensive and anti-cancer therapy. Received "Distinguished Center" status in 1991.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
<i>Current State Contract \$100,000</i>	<i>*Membrane transport</i>	<i>*Secured nine US patents and currently has five more pending</i>	<i>*Spin-off TheraTech, Inc. has 47 employees with \$2.5 M in sales in 1990</i>
<i>Matching Funds Cumulative \$9,171,806</i>	<i>*Novel hydrogels</i>		
<i>Center Related Jobs 52</i>	<i>*Polymeric surfactants</i>	<i>*CCCD is the world center in medical polymers and drug delivery systems</i>	<i>*New spin-off company, Insutech, Inc. formed to specialize in insulin delivery systems</i>
<i>Industry Jobs Created 71</i>	<i>*Macromolecular drugs</i>		
<i>Benefiting Utah Companies 3</i>	<i>*Heparin removal filters</i>	<i>*Sponsors international symposium on drug delivery systems every other year</i>	<i>*TTI will begin marketing a female hormone patch, est. \$5 million first year.</i>
<i>Patents Applied 5</i>	<i>*Insulin delivery systems</i>		
<i>Patents Issued 9</i>	<i>*Design of nonthrombogenic surfaces</i>		
<i>License Agreements 4</i>	<i>*Oral delivery of peptides (insulin)</i>	<i>*Nine patents licensed to two Utah companies</i>	<i>*Research Medical, another Utah company, is clinically evaluating heparin filter based on center technology should produce sales of \$50 million/year</i>
	<i>*Biodegradable polymeric prodrugs</i>	<i>*Over 50 researchers toured CCCD facilities to discuss future research collaboration and joint research</i>	
	<i>*Colon targeting</i>		
	<i>*Targetable anti-cancer systems</i>		

Center for X-Ray Imaging

Dr. Larry Knight/Brightham Young University/Provo, Utah

Established in 1987, this center has successfully commercialized x-ray research by carving a product niche among the biggest manufacturers in the analytic instrument business. The ability to reflect and focus x-rays permit scientists to achieve remarkably high resolution when measuring minute objects. Experiments should begin soon on the compact x-ray laser, an instrument necessary for the success of the Strategic Defense Initiative. In addition to defense applications, advanced x-ray technology is used to detect trace materials in substances and would provide simpler, safer medical testing. Continued funding from national laboratories (LLNL, Oakridge). Support in excess of \$13 million, private sector.

Overview		Technologies	Status	Economic Impact
Current State Contract	\$100,000	* Atomic Layer Epitaxy (ALE)	* Spin-off company MOXTEK created with 8 jobs & sales of \$400K to date	* Spin-off company, MOXTEK has received four Phase I SBR grants and one Phase II SBR
Matching Funds	\$310,013	* MultiLayer X-ray Optics		
Cumulative	\$1,640,568			
Industry Jobs Created	15	* Leading edge technology in X-ray imaging	* 10 years of experience in a difficult research area. Have become leaders with little or no competition	* Near term market for large & small X-ray windows is \$6 million annually
Center Related Jobs	20			
Benefiting Utah Companies	1	* X-ray laser technology		
Newly Created Utah Co's	1	* Thin film technology and diagnostics	* Can create multi-layer reflectors with film thicknesses between 3 and 20A	* \$100 million markets possible in medical & non-destructive testing areas
Patents Applied	4			
Patents Issued	3	* Bright x-ray sources		
License Agreements	1			* MOXTEK negotiating with venture capital companies for expansion
		* Electronic x-ray detectors	* Technologies with commercial potential include:	
		* State-of-the-art signal processing	<ul style="list-style-type: none"> ● Micro x-ray source ● Reflective x-ray optics ● X-ray laser ● Phase microscope 	
		* Pure silicon production		<ul style="list-style-type: none"> ● Submitted 2 proposals for federal grant programs (ATP and AXOP)

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INFORMATION TECHNOLOGIES

Center for Computer Aided Engineering Design & Mfg.

Dr. Steven E. Benzley/Brighton Young University/Provo, Utah

Established center in 1991. The main focus is research in computerized drafting, 3-D design, solid modeling, finite element modeling, numerical controlled mfg., robotics, facilities management, plant monitoring and control, data base management and inventory planning.

<u>Overview</u>		<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract Matching Funds	\$100,000 \$449,135	*Six software products: ●Promod ●Robline ●OPTDES ●CATS ●Movie (C-Quell/Moviestar BYU ●Maxxicad	*New products scheduled for release by the end of the year. *Recipient of grants from Ford Motor Corp., Sandia National Labs, NSF, IBM and Motorola.	*Sales/Revenue figures: Software Licenses: \$88,500 *3 Utah companies have spun-off from this center. Provide a direct outlet of center products and professional employment opportunities for graduate students associated with the center.
Industry Jobs Created	69			
Center Related Jobs	41			
Benefiting Utah Co.'s Spin-off companies	10			
Patents Applied	1			
Patents Issued	-			
License Agreements	8		*Negotiations underway with IBM, Intergraph, Hewlett Packard, ATTC and a venture capital group based in Europe to establish major license and distribution agreements of center products.	

Center for Computer Based Education

Dr. Jerry Larson / Brigham Young University/Provo, Utah

Established as a center in 1987. State-of-the-art computer-based systems have been designed to improve foreign language and computer science instruction. These programs, currently being adopted by industry and education, are training those from kindergarten through adult education. Improved tools for the design, development and delivery of computer instruction systems are revolutionizing teaching and learning methodology.

Overview		<u>Technologies</u>		<u>Status</u>		<u>Economic Impact</u>	
Current State Contract	-	* Video disc		* World leader in and have over 47 products for foreign & English as a Second Language (ESL) instruction		* Have created a private company Cali, Inc. to distribute products	
Matching Funds	\$376,997	* Digital video interactive systems		* Recognized as a world leader in language acquisition technologies		* Sales of products were \$650K for 1990 (up 33% over 1989)	
Cumulative	\$676,997			* Developed and supports a consortium of over 350 public, private & governmental agencies using sophisticated technologies for foreign language and ESL instruction		* Project growth in 1991 to \$2 million sales	
Industry Jobs Created	21	* Computer authoring systems				* Final products for ESL instruction now being completed in German and Spanish. These will be licensed to a Utah company	
Center Related Jobs	8	* Computer adaptive testing					
Benefiting Utah Companies	1	* Computer based instruction					
Spinoff Companies	1	* Interactive audio/video technologies					
Patents Applied	--						
Patents Issued	--	* CDROM					
License Agreements	2	* New templates and programs for creating and delivering computer interactive audio and video programs					

Center for Computer Graphics & Scientific Visualization

Dr's Richard Riesenfeld and Elaine Cohen, University of Utah, Salt Lake City, Utah

Established center in 1991 that was also awarded a \$14.68 million grant from the National Science Foundation. The federal funding establishes the first national center for computer graphics research. The center will collaborate with four other universities around the country to solve large scale graphic problems. Activities range from artistic rendering and medical applications to engineering design and computer-aided manufacturing.

Overview	Technologies	Status	Economic Impact
Current State Contract	\$100,000	*Alpha 1 related research in modeling, visualization and manufacturing.	*Lead organization in a 5-university National Science Foundation Research Center in computer visualization.
Matching Funds	\$500,000		*Formed a spin-off company, Engineering Geometry Systems, to commercialize Alpha 1 technology.
Cumulative	-		
Industry Jobs Created	2		
Center Related Jobs	15		
Benefiting Utah Co.'s Spin-off companies	-	"Featured on a 2 night "Cover Story" Channel 4 called "Virtual Realities" in August 1991.	*Leveraging applications oriented research and development in computer graphics, computer aided integrated design and manufacturing and scientific visualization for commercialization.
Patents Applied	-		
Patents Issued	-		
License Agreements	1		

Center for Information Technology (Handicapped Education)

Emeritus Center

Dr. Alan Hofmeister/Utah State University/Logan, Utah

Established as a center in 1988. Technologies are going developed to capture, crystallize and disseminate human expertise. The center uses a range of artificial intelligence and video technologies to increase the quality of problem solving and training tools available to industry and education.

<u>Overview</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract -	* Laser videodisc technology	* \$1.8 million from outside sources incl. SC, WY, Wash, FL, VA, MD
Matching Funds Cumulative \$5,832,196	* Digital video interactive systems 28	* Helped Systems Impact, a Salt Lake City company to relocate to Utah and reach annual sales of \$5-7 million and 16 employees
Industry Jobs Created 28	* Video disc products in science and mathematics	* 1 new spin-off: Effective Instructional Tech
Center Related Jobs 52	* Recognized nationally as leading center for sophisticated use of technology and quality of instructional design	* Brought more than \$5 million in research and development monies to the state in 3 years
Benefiting Utah Companies Moved Spinoff Companies 3 1 1	* Expert systems technologies * Field-based problem solving and training	* Received \$450,000 in federal funding to apply DVI (digital video interface) technology to instructional applications with deaf persons
Patents Applied -	* Leading educational group using artificial intelligence for special education administration	* Using a range of artificial intelligence and video technologies as training tools for industry and education
Patents Issued 2	-	* Quality of technology has increased the credibility of the state with Fortune 500 firms.
License Agreements -	-	

Center for Inverse Problems, Imaging and Tomography

Steven A. Johnson/University of Utah/SLC, Utah

This center was created in 1989. The breadth of research underway at this center is devoted to solving imaging problems with diagnostic medical scanning, seismic imaging, sonar and radar. Current projects include: advanced medical ultrasound scanners, geophysical imaging for oil exploration and advanced imaging for buried hazardous waste remediation.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	\$100,000	* Medical Ultrasound	* New U of U spinoff company using technology (TechniScan)
Matching Funds	\$256,924	imaging	* New company pending formation
Cumulative	\$791,624		* Medical market of \$2 billion
Industry Jobs Created	29	* Bottom and Subbottom sonar	* Other markets of similar size
Center Related Jobs	21	* Ultrasound non destructive testing	* TechniScan negotiating venture capital to expand operations
Benefiting Utah Companies	2	* SBIR Phase II subcontract	
Patents Applied	5	* Geotechnical imaging	
Patents Issued	5	* Optical instrumentation	
License Agreements	3	* Single and multiphase flow measurement * Process control	* Significant technological breakthrough in image scattering. The time has been reduced from 2.5 hrs to 30 min.

Center for Software Science

Dr. Robert Kessler/University of Utah/SLC, Utah

Established as a center in 1990, they concentrate on system software which "operates" the computer, allows programmers to program the computer and enables users to run applications. A parallel Lisp product currently being developed will allow users to solve large problems using networked workstations.

Overview	Technologies	Status	Economic Impact
Current State Contract	\$30,000	*MAC Dump program being distributed to 53 universities/businesses has generated \$9,500	*Future spin-off company is expected in 1992. When it is fully in focus, a royalty situation for both CSS and the U of U will be established
Matching Funds Cumulative	\$3,293,014 \$4,188,089	*Parallel languages to solve problems using networked workstations	*New DARPA project will help Center to establish leadership in object-oriented programming
Industry Jobs Created	-	*Distributed computing allows network connected computers to perform larger tasks more rapidly than on single computer systems	*Phase 1 of common programming environment is nearing completion. Graphical user interface project is beginning
Center Related Jobs	25		
Benefiting Utah Companies	-		
Patents Applied	--		
Patents Issued	--		
License Agreements	--		

Utah Supercomputing Institute

Dr. David M. Grant
University of Utah/SLC, Utah

Established in 1989, in conjunction with researchers from IBM, the mission of USI is to establish a High Performance Computing Center to serve as a computational resource for Utah companies and universities. This partnership among industry and education is a unique resource for solving scientific and engineering problems that require unusually large memory and visualization requirements.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	\$450,000	*Fully operational site	*IBM has contracted for \$13M in matching funds
Matching Funds	\$1,154,600	*Developing infrastructure associated with a high speed communications network and numerically intensive computing resources	
Cumulative	\$27,531,600		
Industry Jobs Created	-	*Increasing cooperative use between universities	
Center Related Jobs	33	*Newsletter published giving information on access and use	
Benefiting Utah Companies	9	*Application of computer codes to scientific and engineering problems requiring numerically intensive high end visualization computer resources	
Patents Applied	--	*UNIX operating system under Beta Test	
Patents Issued	--	*Designated as a large memory competency center by IBM	
License Agreements	--	*2 full time visualization specialists from IBM are working at the center	
		*Exploring a roll-over into a new IBM 390/900 supercomputer that is 3 times as fast and increased memory capacity	

Center for 3-D Software

Eric Pedersen/Dixie College/St. George, Utah

Established center in 1991, to study practical application of three dimensional modeling for the graphic arts industry. State funding will create a consortia among the graphic arts, computer science and art programs at Dixie College.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
<i>Current State Contract</i>	\$50,000	*Create software libraries of three dimensional shapes and textures.	*Newly created libraries will be distributed internationally through Strata, Inc. of St. George. Dixie College will receive a royalty from all sales.
<i>Matching Funds</i>	\$27,523		
<i>Cumulative</i>	\$27,253		
<i>Industry Jobs Created</i>	18	*Hired a person to assist in the development of libraries and training of personnel.	
<i>Center Related Jobs</i>	2	*Studying practical applications of three dimensional modeling for the graphic arts industry.	*Conduct an annual seminar that is self-sufficient. Provide a direct marketing avenue for products developed at the center.
<i>Benefiting Utah Co.'s Spin-off companies</i>	1		*Center is a consortium of Dixie College's graphic arts, art and computer science departments.
<i>Patents Applied</i>	-		
<i>Patents Issued</i>	-		
<i>License Agreements</i>	-		*The school will receive a royalty from college research and industry interaction.

Center for VLSI Design

Dr. Kent F. Smith/University of Utah/SLC, Utah

Established center in 1991. A new technology called Path Programmable Logic (PPL) is an innovative design approach for compact integrated circuits. This technology has been developed in response to an identified market niche for a less expensive, more user-friendly design program. The ability to interface PPL with other commercial software packages makes this design program attractive to smaller engineering firms needing custom integrated circuits.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract Matching Funds Cumulative	\$100,000 \$500,000 500,000	*Physical placement of logic software, libraries and cell libraries. *Interfaces to 3rd party software.	*Transfer of source code of licensed technology to private Utah company.
Industry Jobs Created Center Related Jobs	4 21		*Joint venture was formed with a European company to sell center products in Europe.
Benefiting Utah Co.'s Spin-off companies	1 1		*Development of new tools and libraries in CMOS, GaAs and HBT technologies.
Patents Applied Patents Issued License Agreements	- - 1		*First generation sales of software beginning. *Beginning discussions with companies in the Pacific Rim.

NATURAL RESOURCES
AND AGRICULTURE

Center for Advanced Combustion Engineering Research

Distinguished Center

Dr. L. Douglas Smoot/Brigham Young University/Provo, Utah
Dr. David Pershing/University of Utah/Salt Lake City, Utah

Established as a center in 1986 as a joint project between BYU and the U of U. This center is working towards the clean and efficient use of low-grade fossil fuels. Near term emphasis is on the development of advanced combustion technology that will take advantage of alternative low-cost fuel resources such as coal, heavy oil, oil shale and tar sands. All of these fuel sources are abundant in Utah. Received "Distinguished Center" status in 1991.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	\$ 100,000	*Combustion process strategies	*\$ 13.4 million grant from National Science Foundation from 1989-1994
Matching Funds Cumulative	\$ 2,768,514 \$ 14,737,751	*Fuel structure reaction mechanisms	*Annual budget of \$ 1,108,545 indirect grants and stipends from industry
Industry Jobs Created	39	*Fuel minerals	
Center Related Jobs	138	*Mechanisms for pollutant formation and control	*\$ 3,083,365 in supporting contracts
Benefiting Utah Companies	1	*Reacting, turbulent flows	
Center Spin-offs		*Comprehensive model development	*New spin-off company: Reaction Engineering International
Patents Applied	-		*Annual direct and supported research within the state is \$4-5 million per year
Patents Issued	--		*138 university related jobs funded
License Agreements	20	*ACERC 3-dimensional computer simulation of combustion process code (computer-aided design combustion technology)	

Center for Biotechnology

Dr. Steven Aust/Utah State University/Logan, Utah

Established in 1987, this center utilizes three service laboratories for plant breeding and development, animal disease control and biological/hazardous waste management. A wood rotting fungi has been isolated that will detoxify many of the most dangerous organic hazardous wastes such as PCB's and residual insecticides.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	*Fermentation biology	*White rot fungus renders PCP's & PCB's harmless in the laboratory	*Patent issued for fungus used for environmental clean-up
Matching Funds Cumulative	*Microbiology *Molecular biology	*Treatment of creosote contaminated water has shown effective cleanup in the laboratory	*Market for cleaning up contaminated sites is extremely large
Industry Jobs Created	-	*Bioremediation of explosives in contaminated water & soil	*USU Biotechnology Building has been completed
Center Related Jobs	*Monoclonal antibodies	*Soil contaminated with oil	*Discussing commercialization of white rot fungus with 3 Utah companies
Benefiting Utah Companies	5	*Data analysis	*Income from Service laboratory was \$11,408
Patents Applied	1	*Biological hazard waste management	*Currently supported by NIH grants, contracts from Thiokol, Department of Defense and Dupont
Patents Issued	2	*Macromolecular synthesis and analysis	
License Agreements	1	*Recombinant DNA tech implant breeding & development	
		*Microbiologicals in agriculture	
		*Monoclonal antibodies to control animal diseases	
			*Pursuing opportunity in Poland to educate scientists and transfer white rot technology to European countries

Center for Chemical Separations

Dr. Reed Izatt/Brighton Young University/Provo, Utah

Established as a center in 1987. Researchers with backgrounds in organic chemistry, inorganic chemistry and chemical engineering are studying the full development of a new ligand bonded silica gel technology. The resulting products are used in a variety of separation systems. A few applications of center technology include precious and base metals refining, heavy metal and organic clean-up and nuclear waste management.

<u>Overview</u>		<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract Matching Funds Cumulative	\$50,000 \$328,040 \$1,794,580	*Pilot plant scale up for individual separations *Individually designed macrocycles for molecule separations	*Methodology for precious metals separations developed *Selling product to industry *Need to develop capability in gas, high purity materials and biological separations	*Created spin-off company IBC with 6 jobs & sales projected \$800K in 1990
Industry Jobs Created	24	*Patented technique for attaching macrocycles to solid substrate allows for reuse	*Capability in environmental, analytical & precious metals markers	*Company attracting many sources of growth capital
Center Related Jobs	16	*Ligand bonded silicagel (Superlig) technology	*Battlelite Pacific Northwest Laboratories are funding radioactive cleanup studies	*Process for separating platinum rhodium represents a 40-60% cost reduction to the industry
Benefiting Utah Companies Spin-off Utah Companies	-- 1	*Researching use of superlig materials to remove selected components from highly acidic radioactive waste	*Set up pilot plants in 4 of the largest precious metal refineries in the USA. Metals of interest are rhodium, platinum and palladium	
Patents Applied Patents Issued License Agreements	13 5 1	Areas for Technology Application include: 1. Precious and base metals refining, mining & recycling 2. Heavy metal and organic clean-up from industrial effluents in water and air 3. Analytical scale separation and concentration of species of industrial, medical and environmental importance 4. Nuclear waste management	*Negotiations completed for a grant from Thiokol to develop materials for the removal of ppm amounts of heavy metals from culinary and waste water streams *Recipient of a Phase III SBIR Grant from Metre-General, Inc. *Superlig materials capable of making quantitative separations	*Potential for developing multi-million dollar system to clean up accumulated nuclear waste *Interacted with 8 Utah companies

Center for Chemical Technology

Edward B. Walker/Weber State University/Ogden, Utah

Established as a center in 1990. In its first year as a center, 12 Utah firms received assistance in developing new products. Technologies include the extraction of natural products, separation chemistry and efficient recovery of asphalt and fuels from tar sands. A recent partnership with a Utah company has resulted in plans to use a center-developed recovery technology to produce 500 barrels/day of asphalt from Utah tar sands. This same technology promises new applications in the clean-up of soils contaminated with gasoline or other undesirable solvents.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
<i>Current State Contract \$100,000</i>	* <i>Naturally occurring antibiotics</i>	* <i>New patent issued for tar sands extraction</i>	* <i>Company looking to move to Utah to take advantage of tar sands patent</i>
<i>Matching Funds Cumulative</i>	\$355,567 \$443,754	* <i>Bacteria anti-adherence factor</i>	* <i>23 jobs created this year due to center technology</i>
<i>Industry Jobs Created</i>	139	* <i>Low temperature tar-sand extraction methodology using biodegradable surfactant</i>	* <i>Envirosolve product developed July 1990</i>
<i>Center Related Jobs</i>	9	* <i>Partitions/separations technology</i>	* <i>New environmentally safe solvent introduced</i>
<i>Benefiting Utah Companies</i>	11	* <i>Environmentally-safe solvents to replace CFC-based cleaners</i>	
<i>Patents Applied</i>	2	* <i>Reverse osmosis system validation</i>	
<i>Patents Issued</i>	1		
<i>License Agreements</i>	1		

Center for Coal Research

Dr. Larry Anderson/University of Utah/SLC, Utah

Established as a center in 1987. The main focus is the development of new markets for Utah coals and their products. The center promotes efforts to bring university and industry researchers together to develop and implement advanced methods of processing, upgrading, and preparation of Utah coal and tar sand resources. Current research activities include the implementation of coal/water slurry transport, differential liquefaction and resin extraction.

<u>Overview</u>		<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	--	*Coal slurry transport	*Patent applied for on new method of extracting resin from coal	*Research supports small ink business in Price, Utah
Matching Funds Cumulative	\$1,505,313 \$3,232,045	*Resin extraction from Utah's unique high resin coal	*Has potential for 1,000 jobs in 5 yrs	*State's coal reserves total 24 billion tons; high in fossil resin and heat content and low in pollution
Industry Jobs Created	44	*Partial liquefaction to advanced jet fuels	*One of the top three centers for coal research in the nation	*3 spin-off companies created
Center Related Jobs	9	*Pyrolysis/differential liquefaction	*9 patents issued	
Benefiting Utah Companies	3	*Coal/liquid slurry technology and coal preparation		
Patents Applied	1	*On-line coal conversion monitoring techniques		
Patents Issued	9			
License Agreements	1			

Center for Dairy Foods Technology

Dr. Paul Savello/Utah State University/Logan, Utah

Established as a center in 1990. In its second year of funding, this center uses two innovative processes, Ultra-filtration and Ultra-High Temperature to develop new dairy products and to increase their shelf-life. The center also focuses on a concept of fractionating milk, much like petroleum, to develop markets for value-added components. Technology at this center has helped one out-of-state firm relocate to Utah, and its essential to the operation of two Utah companies.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	*Methods to fractionate and concentrate milk components in non-degradative ways.	*Technology has attracted one firm to relocate to Logan	*Technology will greatly add value to the milk raw material
Matching Funds Cumulative	\$130,000 \$275,000 \$558,000		*Producing a product line for a Utah company that will be distributed through a multi-national corporation
Industry Jobs Created	6	*Have developed new skin milk that tastes like 2% or whole milk	*A newly established firm has been exploring a new aseptic concentrated milk product for export
Center Related Jobs	2		
Benefiting Utah Companies Relocated	2	*USC specialized membranes of various pore sizes to separate milk properties	*Have created powdered milk blend that makes feta or cottage cheese over night, only adding tap water
Patents Applied	1		
Patents Issued	2		
License Agreements	-		

Center for Meat Processing Technology

Dr. Von T. Mendenhall/Utah State University/Logan, Utah

Established as a center in 1991. Researchers are developing meat processing technologies to increase shelf-life during refrigerated storage, reduce fat and create new value-added meat products.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	\$100,000		
Matching Funds	\$215,950		
Cumulative	\$215,950		
<i>Industry Jobs Created</i>			
<i>Center Related Jobs</i>			
<i>Benefiting Utah Co.'s Spin-off companies</i>			
<i>Patents Applied</i>			
<i>Patents Issued</i>			
<i>License Agreements</i>			

Center for Solid Waste Recycling

Dr. Reed M. Nielsen/Utah State University/Logan, Utah

Established 1991. The separation of recyclables from waste streams is currently a hand process. A prototype machine has been developed that will collect and transform polystyrene (gathered from waste streams) into raw material suitable for manufacturing a variety of consumer products. There is no automated equipment for the collection of polystyrene on the market at the present time.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
Current State Contract	\$50,000	*Designed, refined and fabricated automated equipment for removing polystyrene from predictable waste streams.	*Preliminary work on a license agreement has begun.
Matching Funds	\$36,000		
Cumulative Match	\$36,000		*Working closely with Huntsman Chemical.
Industry Jobs Created			
Center Related Jobs	4		
Benefiting Utah Co.'s Spin-off companies	-		
Patents Applied	-		
Patents Issued	-		
License Agreements	-		

Center for Value Added Seed Technology

Dr. Grant Vest/Utah State University/Logan, Utah

Established center in 1991. Currently developing patented breeding lines of wheat that will increase yields 10 to 15%. A special turf seed is being researched that is drought resistant, requiring 25 to 40% less water than current turf.

<u>Overview</u>	<u>Technologies</u>	<u>Status</u>	<u>Economic Impact</u>
<i>Current State Contract</i>	\$70,000	*Biotechnology ● Plant tissue culture ● Molecular Biology	*Received a USDA grant of almost \$90,000
<i>Matching Funds Cumulative</i>	\$142,300 \$142,300	*Plant Physiology	*Drought tolerant turfgrass will be released in three years
<i>Industry Jobs Created</i>	-	*Plant Breeding, Genetics and Cytogenetics	*Efforts to transfer DNA from sainfoin (bloat safe) to alfalfa (bloat causing) via microinjection and electroporation is underway
<i>Center Related Jobs</i>	14	*Develop drought-tolerance turf	*Hybrid wheat could create value added wheat seed production for Cache Valley
<i>Benefiting Utah Co.'s Spin-off companies</i>	-	*Transfer apomixis from wild grass species into commercial small grain crops	*Developing improved varieties of small grains and forages
<i>Patents Applied</i>	-		
<i>Patents Issued</i>	-		
<i>License Agreements</i>	-		

APPENDICES

*Annual Return Calculations
FY 1991*

Ratio of Matching Contract to State Funds:	
1990-1991 Matching Funds	\$ 33,160,390
Current State Funding	\$ 2,287,500
Ratio	\$ 14.5:1

Number of jobs created x average income:

$$2,026 \times \$28,936 = \$58,624,336$$

Annualized Economic Impact
(Assume 1.5 as a conservative multiplier)

$$1.5 \times \$58,624,336 = \$87,935,744$$

Annual Return to the State:
(Assume State & Local taxes at 12.5%)

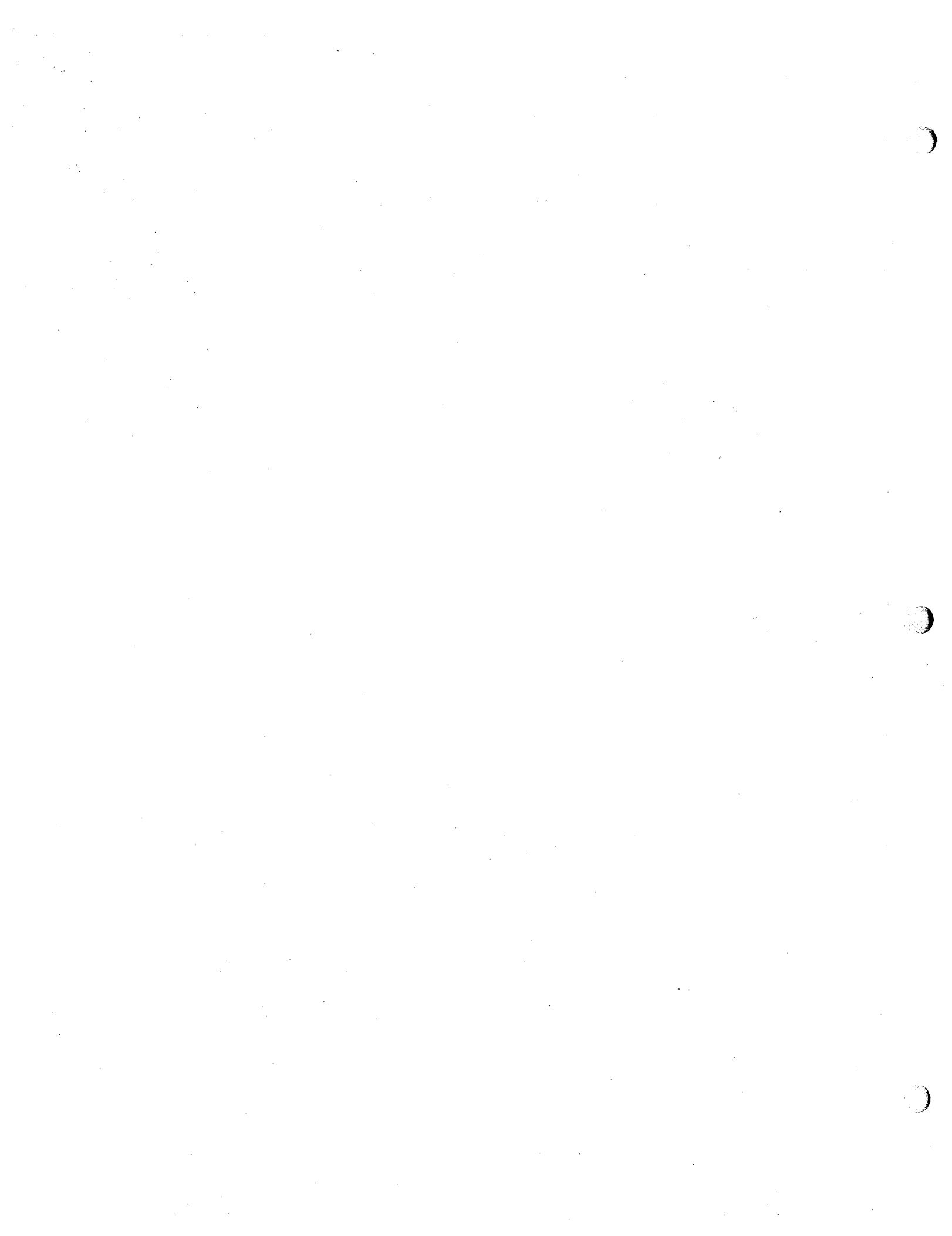
$$\$87,935,744 \times 12.5\% = \$10,991,968$$

CENTERS OF EXCELLENCE Cumulative Statistics

November 1, 1991

Center (* = 6 months)	Ins	FY'92 State Contract	Cum. State Contract	FY'92 Match	Cumulative Match	Equipment Value	Crr. Avg. Ctr. Ind.			User Co. Moved to Utah			
							Crr. Emply. & Grad.	Patent Co. Cum.	New Co. 1991	Patent Co. Cum.	New Co. 1991	Patent Co. Cum.	New Co. 1991
ACERC	BYU	\$100,000—	\$600,000	\$2,768,514	\$14,737,751	\$11,400,000	138	\$26,704	39	\$50,761	27	—	—
Adv. Comp.	BYU	\$100,000—	\$165,000	\$1,166,050	\$1,305,853	\$375,000	14	\$17,143	219	\$22,146	60	8	8
Aerospace	WSU	\$50,000—	\$675,000	\$400,883	\$2,500,000	\$9	\$14,555	25	\$43,750	57	—	—	
Art. Heart	U/U	—	\$475,000	\$2,769,003	\$10,755,877	\$2,000,000	51	\$30,323	—	—	—	2	3
Biocatalysis	USU	\$100,000—	\$840,000	\$2,201,000	\$3,142,530	\$2,250,000	20	\$16,350	5	\$26,500	28	—	—
Biopolymers *	U/U	—	\$670,000	\$822,395	\$4,232,182	\$3,063,680	30	\$22,833	10	\$34,912	9	—	—
Biotechnology	USU	\$100,000—	\$910,000	\$368,160	\$3,821,536	\$1,312,313	19	\$17,848	—	—	75	—	—
Chem. Separation	BYU	\$50,000—	\$796,645	\$328,040	\$1,794,580	\$25,000	16	\$11,341	24	\$24,208	18	2	1
Chem. Tech.	WSU	\$100,000—	\$174,000	\$355,567	\$443,754	\$2,805,000	9	\$28,177	139	\$24,114	301	5	13
Tomography	U/U	\$100,000—	\$167,400	\$256,924	\$791,624	\$1,480,000	21	\$33,762	29	\$38,500	7	—	—
Ctrl. Chem. Del.	U/U	\$100,000—	\$646,000	\$1,126,566	\$9,171,806	\$525,000	52	\$20,852	71	\$23,508	22	—	—
Eng. Design	U/U	\$100,000—	\$863,000	\$2,973,880	\$14,720,383	\$2,300,000	42	\$35,240	109	\$23,605	1244	3	21
Meat Processing	USU	\$100,000—	\$100,000	\$215,950	\$220,000	7	\$21,142	—	—	10	1	—	—
Comp. Bas. Ed.	BYU	—	\$510,000	\$376,997	\$676,997	\$42,198	8	\$15,340	21	\$20,426	—	—	—
Info. Tech. *	USU	—	\$436,325	\$303,495	\$5,832,196	\$600,000	52	\$26,333	28	\$35,333	27	—	—
Adv. Materials	U/U	\$150,000—	\$755,700	\$1,605,704	\$3,940,251	\$10,000,000	20	\$63,222	45	\$28,450	13	1	3
Qual. & Int. Des. *	U/U	—	\$260,000	\$286,000	\$921,018	\$2,400,000	16	\$14,250	8	\$10,750	8	1	2
Software Sci.	U/U	\$30,000—	\$130,000	\$3,293,014	\$4,188,089	\$1,670,000	25	\$48,036	—	—	8	—	—
Space Eng. *	USU	—	\$1,050,000	\$1,478,688	\$7,449,842	\$3,000,000	21	\$32,333	284	\$32,666	55	—	—
Supercomputer *	U/U	\$250,000—	\$1,125,000	\$1,154,600	\$27,531,600	\$15,500,000	33	\$50,000	—	—	50	—	—
URI *	USU	\$57,500—	\$895,500	\$3,834,567	\$4,978,547	N/A	49	\$27,245	—	—	25	—	—
X-Ray	BYU	\$100,000—	\$560,000	\$3,110,013	\$1,640,668	\$1,620,000	20	\$38,760	16	\$34,500	3	—	—
Coal	U/U	—	\$390,000	\$1,505,313	\$3,232,045	\$1,950,000	9	\$20,000	44	\$33,614	2	2	9
Dairy	USU	\$130,000—	\$150,000	\$275,000	\$558,000	\$350,000	2	\$41,000	6	\$28,000	15	—	—
Solid Waste	USU	\$50,000—	\$50,000	\$36,000	\$36,000	\$100,000	4	\$45,000	—	—	4	—	—
Value Seed *	USU	\$70,000—	\$70,000	\$142,300	\$142,300	\$2,000,000	14	\$36,600	—	—	—	—	—
CA2EDM *	BYU	\$100,000—	\$100,000	\$449,135	\$449,135	\$645,000	41	\$27,073	69	\$34,072	108	1	8
Cancer Genetics *	U/U	\$100,000—	\$100,000	\$1,329,109	\$1,329,109	\$300,000	30	\$28,262	1	\$100,000	—	—	—
Graphics & Vis. *	U/U	\$100,000—	\$100,000	\$500,000	\$500,000	\$1,500,000	15	\$35,800	2	\$35,000	—	1	—
VLSI Design *	U/U	\$100,000—	\$100,000	\$500,000	\$500,000	\$480,000	21	\$28,857	4	\$40,000	4	1	—
3D Software *	DIX	\$50,000—	\$50,000	\$27,523	\$27,523	\$135,430	2	\$23,500	18	\$24,935	15	—	—

Total Match Ratio: 14.50
 Annualized Economic Impact: \$87,935,744
 Annual Return to State: \$10,991,968
 Ratio: 4.81



Utah Centers of Excellence Program
Planning Grants Summary
(Since 1986)

1. Biotechnology	\$10,000
2. Water Information Science & Control	10,000
3. Advanced Fossil Fuel	15,000
4. Advanced X-Ray	7,500
5. Communications	10,000
6. Microelectronics	10,000
7. Non-Intrusive X-Ray	7,500
8. Developing Heavy Oils to Asphalt	10,000
9. Tar Sand Binders	15,000
10. Quality and Integrity Design	10,000
11. Rural Manufacturing	10,000
12. Cancer Genetic Epidemiology	10,000
13. Artificial Heart	20,000
14. Drug Discovery	10,240
15. Integrated Science Education	10,000
16. Snow College	10,000
Subtotal	175,240
Recovered	15,000
Total	\$160,240

EXECUTIVE SUMMARY

*Utah Centers of Excellence Program: A Review and Assessment
by Walter H. Plosila, Ph.D.*

Dr. Walter H. Plosila is currently President of the Montgomery County (Md.) High Technology Council, Inc., a non-profit organization of high technology firms, federal laboratories, and higher education institutions. Dr. Plosila was instrumental in the development and implementation of one of the largest state technology development programs -- Pennsylvania's Ben Franklin Partnership--during the early and mid-1980's. Since that time he has consulted with over 30 states in the development, monitoring, and assessment of their state technology development efforts. He serves on the National Science Foundation's Industrial Science and Technological Innovation Advisory Board and is a speaker on technological innovation throughout the U.S. and abroad.

Overview

- Utah's Centers of Excellence Program can be considered a national model for demonstrating how centers of excellence can play effective roles, not just in research, but in technology and economic development as well. Utah has been able to mount an impressive effort over the past five years with a minimal state financial investment.

Program Scope and Impact

- Utah's Program ranks among the leading state technology development programs in commercializing its R&D through Centers of Excellence. Utah's Centers of Excellence Program compares most favorably with and generally exceeds the impacts achieved of technology programs in other states.
- Over the past five years the Program has assisted 53 firms either to spin-off or grow with Center assistance. Sixty patents have been applied for; 29 issued; and 43 licensing agreements have been signed. The Program has assisted in the creation of 748 private sector jobs; pumped \$27.9 million into the state economy; and provides an annual return in state and local taxes to the state and its localities of \$3.5 million when only considering private jobs. On a cost per job basis the average cost per private sector job created has been \$13,074.
- Utah's Program has the largest matching funds leverage of any State technology program in the U.S. with an overall match of 10:1. Of this match, 58% came from the Federal government and 42% from the private sector. And

70% of the private sector's match was in the form of cash. The Program is obtaining \$4.28 from the private sector for every \$1 of state match.

- While Utah has more Centers of Excellence than any other state, its centers are narrower in focus. Many centers represent project grants between faculty and one or two start-up firms. When such centers are excluded, Utah ranks only on the higher side in number of centers.

- Utah may be the only state that has a formal policy of Center graduation and limits funding to no more than five years. Most States recognize technology development centers as long term investments to be sustained over an 8-10 year period. Other states have changed their policies on self-sufficiency to recognize this. Because Utah's program builds its Centers on a base of previous Federal and private sector support, state funding represents only 8.5% of the total budgets of centers currently being funded, with a range from 2% to 42%.

Structure and Organization

- Utah's program is effectively run and takes maximum advantage of opportunities to utilize state funds to focus on product development and commercialization of Centers' research. Utah has uniquely found ways to focus its State resources on the more "downstream" aspects of each Center's activities in ways that capture their R&D work for commercial applications.

- Utah's program administrators have been willing to make "hard choices", both in selection of centers and renewal of center funding, in concert with their Advisory Board, by rewarding performance and accomplishment in fund allocations. The Program has been administered with increasing rigor, but with flexibility and a willingness to permit diversity and take advantage of new opportunities.
- Staffing support of the Program is on the low side in comparison to programs in other states. Management of contracts and expenditures and handling of procurement are adequate but with a need for increased program monitoring and contract administration.

Funding Needs and Strategies

• Utah State governments' financial commitment to the Centers of Excellence Program ranks it only among the middle of the States. It is far below the investment levels of other states with centers-type programs. Utah will face increased competition in the same targeted technologies from other states who are investing substantially more in their centers to improve their competitive advantage.

• To compete effectively with other states and in the world economy, Utah will have to consider changes in its investment efforts. Today state funding is too small and distributed too widely to take full advantage of emerging opportunities.

Recommendations

1. The management of Utah's Program will further improve with the recent hiring of a Deputy Director. It is recommended that the Program have available to it a full-time contract administrator.
2. Utah's Program focuses particularly on a "technology push" approach; additional attention should be given to a "market pull" approach, increasing the awareness and involvement of existing Utah firms in individual centers.
3. Utah State Government should consider increased funding for the Centers of Excellence Program, based on its demonstrated track record. Not only is the Program one of the most successful State technology programs in the U.S.,

but its economic impact has resulted in the Program returning more in revenues than it is costing the State in expenditures.

4. Utah State Government should consider initiating and adopting a State Science and Technology Strategy that would incorporate the efforts of all its departments and agencies and the results of the work of various task forces and advisory groups, to assure that the Centers of Excellence Program is reinforced with other initiatives and policies.
5. The Centers' Program should continue to have a limitation of five years for state funding. Centers should continue to be graduated. For graduated Centers, the Program should provide funding for individual projects with commercial potential.
6. Centers should consider additional ways to assist in technology transfer through such activities as market information and "front-end" marketing assistance, testbed facilities, education and training, and demonstrations. Additional technology transfer mechanisms, outside of the university environment, may be necessary to provide these kinds of increased services. One way to determine industry interests is increased emphasis on surveying industry.
7. The State of Utah may wish to further explore its comparative advantages within the four sectors targeted by the Centers of Excellence Program to improve its ability to use the Program as a strategic investment for the long-term future prosperity of the State.

Centers of Excellence Publicity Articles 1991

Total articles: 77
Publications: 14

Deseret News (35)

Jan. 9, 1991
Jan 16, 1991
Jan 17, 1991
May 24, 1991
May 31, 1991
June 24, 1991
July 17, 1991
July 21, 1991
July 28, 1991
July 29, 1991
July 31, 1991
August 2, 1991
August 5, 1991
August 6, 1991
August 8, 1991
August 11, 1991
August 19, 1991
August 24, 1991
September 3, 1991
September 6, 1991
September 12, 1991
September 19, 1991
September 25, 1991
September 26, 1991
September 27, 1991
September 29, 1991 (2)
October 7, 1991
October 11, 1991 (2)
October 17, 1991
November 21, 1991
November 29, 1991
December 12, 1991
December 21, 1991

Salt Lake Tribune (14)

Feb 8, 1991

February 16, 1991

February 19, 1991

May 25, 1991

June 9, 1991

June 30, 1991

July 17, 1991

August 1, 1991

August 20, 1991

August 23, 1991

August 30, 1991

September 5, 1991

September 28, 1991

October 11, 1991

December 3, 1991

Salt Lake Enterprise (4)

August 16, 1991

August 19, 1991

September 7, 1991

December 2, 1991

Weber State Signpost (3)

July 16, 1991 (2)

September 27, 1991

Utah Business Magazine (3)

May 1991

March 1991

November 1991

University of Utah Continuum (1)

May 1991

BYU Today (2)

July 1991

September 1991

Capitol Capsules (1)

June 1991

St. George Daily Spectrum (4)

August 12, 1991

August 16, 1991

August 18, 1991

September 28, 1991

U/U Technology Transfer Newsletter (2)

October 1991

November 1991

Business Week (1)

December 16, 1991

Utah Update (1)

Winter 1991

Centers of Excellence get an excellent rating

■ Project development: Expert says Utah program excels in its use of funds.

By Roger Pusey
Deseret News business writer

jobs, pumped \$27.9 million into the state's economy and resulted in \$3.5 million paid in state and local taxes by the people holding those jobs.

Plosila said Utah's Center of Excellence Program has the largest matching fund leverage of any state technology program in the United States, meaning that for every \$1 the state puts in, other investors put in \$10. Of the matching money, 58 percent came from the federal government and 42 percent from the private sector.

He said Utah's program, with Michael Alder, director, and Jerry Foote, deputy director, is effectively run and takes maximum advantage of opportunities to utilize state funds to focus on product development and commercialization of centers research.

The state's commitment to the program ranks in the middle of the programs in 46 states. "Utah will face increased competition in the same targeted technologies from other states who are investing substantially more in their centers to improve their competitive advantage," he said.

In addition to a recommendation that more state money be put into the Centers of Excellence Program, Plosila said state officials should consider initiating and adopting a state science and technology strategy that would incorporate the efforts of all departments and agencies, and the result of the work of various task forces and advisory groups, to assure the centers program is reinforced with other initiatives and policies.

After Plosila made his presentation to the economic development board, members voted to approve funding for three centers programs, including \$90,000 for the Center for Inverse Problems, Imaging and Tomography at the University of Utah; \$26,000 for the Center for Engineering Design at the U; and \$100,000 for the Center for Dairy Foods at Utah State University.

Utah's Centers of Excellence Program can be considered a national model for demonstrating how centers of excellence can play effective roles, not just in research, but in technology and economic development as well. That word comes from Walter H. Plosila, who developed and implemented the Ben Franklin Partnership Program in Pennsylvania — the largest state technology development effort in the United States.

"Utah has been able to mount an impressive effort over the past five years with a minimal state financial investment," he told members of the Utah Economic Development Board Tuesday and the Pioneer Partnership Wednesday.

The Centers of Excellence Program attempts to utilize technology developed in Utah colleges and universities and transform it into commercial enterprises. The program uses some funding from the state that ordinarily is matched several times over by venture capitalists, the federal government or private companies.

Plosila, who was hired to give the board an idea if the centers program was headed in the right direction and to see if the state was getting something for its money, said that in the past five years the program has helped 53 firms grow or get started.

Sixty patents have been applied for, 29 have been issued and 43 licensing agreements have been signed. Plosila said the program has assisted in the creation of 748

3r Chiefs life Sales

orted downtown, with 1990.

ning before Christmas, the centers in the Salt Lake Valley continue their present pace or

/alley Fair Mall, said daily vehicles entering the mall

s Christmas shopping sea- rier losing nor gaining but y attractions apparently is

on. In addition, there are nd music groups perform

keswoman for the ZCMI the majority of the stores , said people are curious

Utah's Centers of Excellence praised

By Roger Pusey

Deseret News business writer

Utah's Centers of Excellence program is considered a national model for demonstrating how centers of excellence can play effective roles, not just in research, but in technology and economic development as well.

This statement is contained in a report prepared by Walter H. Piosila, director of the Montgomery County Technology Council in Washington, D.C., who evaluated the centers program over the past 13 months. The report has been given to the Utah Board of Business and Economic Development and will be given to the Legislature in January by Mike Alder, program director.

The Centers of Excellence program is designed to transfer technology created on higher education campuses into the private sector and create companies and jobs. This is done by using state money to attract money from government and private industry sources.

In the period Oct. 1, 1990, to Nov. 1, 1991, the state put \$2.4 million into the Centers of Excellence program and the projects received \$33.1 million in matching funds from outside

sources, a ratio of 14.50 to 1, the report said.

The annualized economic impact of the programs is \$87.9 million, and the annual return to the state is \$10.9 million.

The report showed that in the 13-month period 1,216 jobs were created in the industry and 810 new jobs in the centers. That compares to 748 jobs in the industry and 557 jobs in the centers in the previous 13 months. Some 14 companies were created in the most recent fiscal year.

In the past five years, the Centers of Excellence program has assisted 53 firms either to spin off or grow with center assistance. During that period, Sixty patients have been applied for and 29 issued, and 43 licensing agreements have been signed.

The report said the Utah centers program has the largest matching funds leverage of any state technology program. For every \$1 of state money put in, the matching funds total \$10. Of the matching funds total \$10. Of the federal government and 42 from the private sector.

Among the recommendations made in the report are:

— Management of the centers program will improve more with the recent hiring of a deputy director, and a full-time contract administrator should be hired.

— Utah's program focuses particularly on a "technology push" approach, and additional attention should be given to a "market pull" approach, increasing the awareness and involvement of existing Utah firms in individual centers.

— The Legislature should put more money into the program based upon its demonstrated track record.

— State officials should consider initiating and adopting a state science and technology strategy to incorporate efforts of all departments and agencies and efforts of task forces to ensure the centers program is reinforced with other initiatives and policies.

— The centers program should continue with a limitation of five years of state funding.

— Centers should consider additional ways to assist in technology transfer through such activities as market information and "front-end" marketing assistance, test-bed facilities, education and training and demonstrations.

DESERET NEWS, MON. P.M./TUES. A.M., JULY 29-30, 1991 D 5

2 Utah Centers of Excellence excel to national research level

By Roger Pusey

Deseret News business writer

Utah is quickly becoming recognized as a place to conduct research and development. In the past six months, two Utah Centers of Excellence have been named national research centers and several have received multimillion-dollar awards.

Colleges and universities are wellsprings of technology, but channeling useful new ideas into the market-place isn't always easy.

To overcome that hurdle, the state's Centers of Excellence awards money for technology development and attracts private capital that often results in the formation of companies that turn the technology into products and services.

So far, there are 35 Centers of Excellence, includ-

from the Board of Business and Economic Development, according to G. Michael Alder, director.

In the past five years, state-funded research has created more than 40 private technology firms, and more than 90 companies benefit directly from the partnerships with Centers of Excellence. Alder said the centers receive \$3.60 in outside money for every dollar the state puts in.

Seven of the eight new centers have been established at the largest universities in Utah — University of Utah, Brigham Young University and Utah State

forms of cancer and focuses on the most common types of cancers: breast, colon, prostate and melanoma.

— Center for VLSI Design, U., \$100,000. Patho- grammable Logic is an innovative design approach for compact integrated circuits. This new technology has been developed in response to an identified market niche for a less expensive, more user-friendly design program.

— Center for 3D Systems, Dixie College, \$50,000, to study practical application for three-dimensional modeling for the graphic arts industry.

— Center for Computer-Aided Engineering Design Manufacturing, BYU, \$100,000, whose mission is to "conceive, develop and integrate software products that significantly increase the productivity of engineers."

— Center for Dairy Foods Technology, USU,

\$130,000, studying new innovative processes of ultrafiltration and ultra-high temperature to increase the shelf life of dairy products.

— Center for Meat Processing Technology, USU, \$100,000, where researchers are developing meat processing technologies to increase shelf life during refrigerated storage, reduce fat and create new value-added meat products.

— Center for Solid Waste Recycling, USU, \$50,000, where a prototype machine has been developed that will collect and transform polystyrene into raw material suitable for manufacturing a variety of consumer products.

— Center for Value Added Seed Technology, USU, \$70,000, which is developing patented breeding lines of wheat that will increase yields 10 percent to 15 percent. Also, a special drought-resistant turf seed is being researched.